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# AVRT6 APRS User Manual

V1.2 ( For reference only, also updates )



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# Foreword

APRS system, widely used in many countries have already HAM friends, community organizations, departmental units, field operations personnel. However, according to the case of my years in HAM circles dawdle get, very few people in China know, not many people know, people use less. From the beginning of a decade ago, China has introduced this system in the promotion of amateur, but until now, to support this function radio price high above, beyond the level of consumption of the Friends of the majority of HAM. Difficult universal application, I BG6QBV jointly designed and produced a low-cost equipment AVRT5, AVRT6, write manuals to fully understand the national entry.

## AVRT6 The main function

To say that the original design AVRT6 (hereinafter referred to as T6) when there playing APRS fans asked me to play the radio say, why should add GPRS?

In fact, the design of the main functions T6 4:

- 1, some users have purchased the use of radio, with T6, will be able to increase the APRS functionality at low cost, and more powerful than the common market, APRS station equipment function;
- 2, in the city or in the field, there are blind radio, GPRS is also blind, blind to the complementary, as far as possible to protect most of the positions have data uploaded to the server;
- 3, increase GPRS, the position data of their own and each other's position has received real-time data can be uploaded to the server over the GPRS, which means that there APRS gateway function. IGATE called the English;
- 4, integrated display, without connecting cell phones, computers or Derek navigation, you can see real-time or distance teammate partners (To see his teammates and their own real-time location, you need to be connected).

## —. Outline

AVRT6 launch is developed on the basis of the above AVRTT-AVRT5 aprs equipment, the main function is to achieve GPRS (mobile network) and radio data transmission mode aprs location. Built-in GPRS mobile network module + GPS module and transceiver TNC codec comprehensive plan. Insert the SIM card and connect the radio to function properly (need to pre-set parameters such as call sign), after positioning (blue LED lit) can be issued with a calibration standard of aprs packets common business aprs compatible equipment and a variety

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of aprsDIGI relay and IGATE, is home to the first version of a network and the radio version + LCD + DIGI + Igate aprs multifunctional devices.

Features: for easy use. Into the phone card or connect the radio and MIC DATA lines to 12V input (usually locate require 1-20 minutes). Easy to use, GPRS is a mobile phone network since uploading coordinates without human intervention, before using the need to set GPRS callsigns 5 aprs network authentication password and login server.

Integrated hardware: GPRS module, GPS module, antenna, MCU MCU, VHF transceiver modules, built-in battery charging IC, temperature sensor, TF card, buzzer, wireless Bluetooth module.

Supplied: GPS antenna, GPRS antenna, MIC-6 line 2, MIC-8 line 2, 6-cell tee 1, an 8-core tee. USB-TTL cable upgrade

1. GPS module:

Ublox-7 module, high sensitivity, fast positioning, stability, power, supporting 50,000-meter altitude mode (no access to the car).

2. GPS antenna:

25 \* 25 active external GPS antenna, built-in LNA amplifies, Star Search, locate quickly.

3. AVR Microcontroller:

Atmega128 the AVR microcontroller, stable and reliable.

4. GPRS module:

Professional 4-band GPRS module, internationally, a good network connection performance, stable and reliable.

5. GPRS Antenna:

Finished GPRS antenna, to ensure the standing wave emission and emission efficiency.

6. No battery :()

7. LED status display (red and blue)

Dual LED display, GPRS status indicator is red. Normal one second flash once when networking.

Blue is the GPS indicator: Fast blinking indicates GPRS SIM card is not logged aprs server or abnormal (arrears or no card). 1 second flash once said that GPS does not locate, lit indicates

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that the GPS positioning.

#### 8. The radio emission aprs data

Radio microphone in hand, then release the PTT finished launching aprs data. Other stations will hear the sound aprs data, the machine can not hear.

#### 9. temperature, barometric pressure sensor (BMP085)

Upgrade for BMP085 temperature, barometric pressure sensor, IC accuracy of 0.0625 degrees, the temperature inside the real-time transmission and board. (Need to measure the external temperature and leads to self-install sensor 18B20)

#### 10 Bluetooth module (connected phone or connected to the computer running APRS map \_ Software)

Built-in Bluetooth module, rate 4800bps, one can decode the signal in real-time output aprs. Android phones can be connected to two input signals KISS, emission control T6. Specific functions see aprsdroid. Third, callsign and other parameters can be configured with Android phones serial commands.

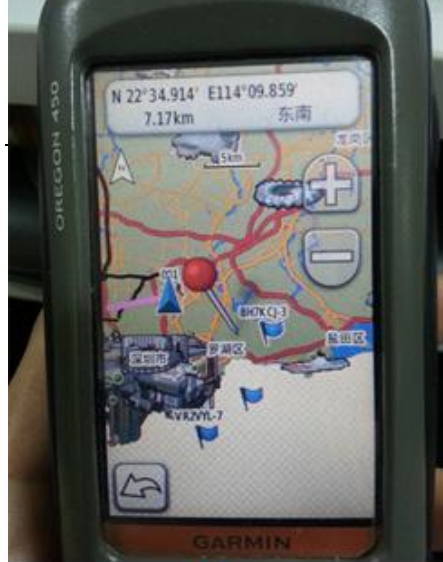
For example: Set callsign: AT + CALL = BG6QBV7

Set buzzer AT + BEEP = 1 Open AT + BEEP = 0 Off

More Bluetooth configuration commands escalating.

#### 11, USB Interface Extension 1 (connection Derek handheld GPS)

USB expansion port, via 5-pin USB cable all-pass, you can directly connect garmin handheld GPS, direct real-time map display distance or location, currently supports direct connection to the display models are as follows:



min 550,

PL input

ns:

he should



NMEA transfer mode, NMEA se  
4800

## MINI USB 线连接 (5芯全通线)

12, USB interface extensions 2 (connected to the computer running APRS map management software)

Can be used to upgrade the line of random distribution, connected to the computer, run APRS map management software, install upgrades line driver and specify COM and rate, the rate is set to 4800 (the same as Bluetooth connectivity)

The most commonly used APRS software: Domestic usually "clouds tracking"; abroad usually AGWTracker etc.

## II. Turned the course

Device connection :( Below is kind Interface)

1. GPRS Function: Connect GPRS antenna, GPS antenna, insert the SIM card to the phone。



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2. Radio transmitter function: to be connected to the radio T6 DATA DATA, the radio microphone in hand and mouth and hand microphone MIC T6's tee connection interface. GPS antenna connected, you can work on radio aprs mode. **Connect 12V** power, AVRT6 will be accompanied on the electric start flashing LED, LCD displays start LOGO, after a self-test launch times into the ordinary working condition.

The blue LED to show the working status:

(1) LED flashes rapidly: GPRS logged in aprs server.

(2) 1 second flashing 1: GPS did not locate.

(3) LED lit: GPS has been located.

(4) If you receive aprs signal, LED will



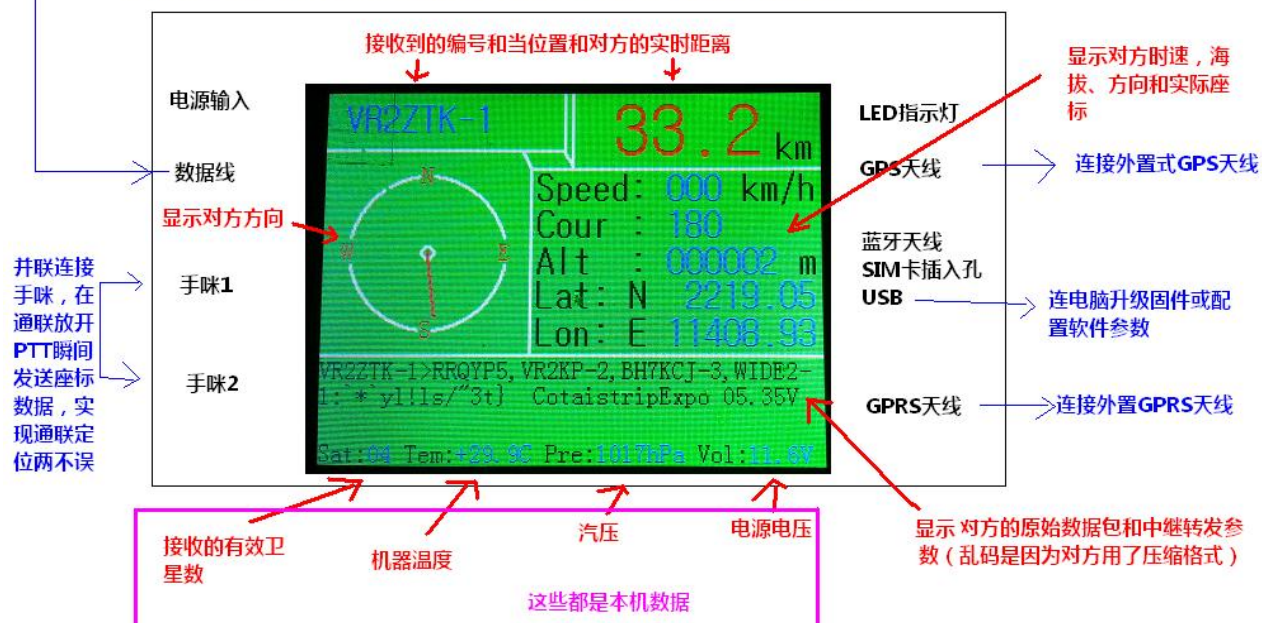
blink.

Insert the SIM card schematic direction

AVRT6 use of block diagrams



连接电台作双向数据传输，T6自身的位置数据通过电台发射出去，电台收到的信号送到T6解码和显示，兼容连接的常见电台有艾可慕2720-2820-208H 八重州7800-7900-8800-8900-817-857-897\_健伍V7等等，通过转接线，可以连接摩托罗拉16针屁股的车台，也可以连接兼容K手咪插头的手台。。。



ICOM 8芯  
手咪插口

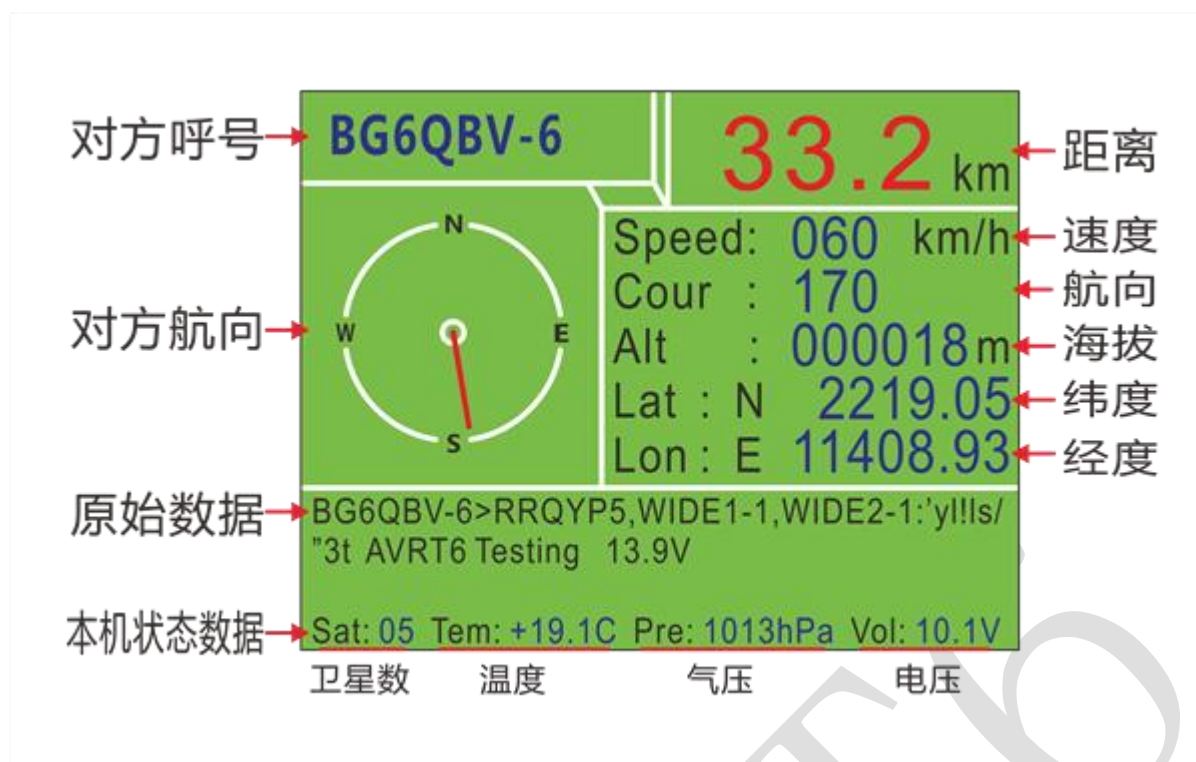
YAESU 6芯  
手咪插口

DATA  
数据线插口

7-12V  
电源插口



Meaning display data represented



Note 1: The bottom screen was a native data, the power will be displayed

Note 2: The upper portion of the display is the actual display the received data, the need T6 has GPS positioning, and have been connected to the radio, the radio receives a valid APRS packets appear.

Note 3: If you just plug in a valid GSM SIM card, the display shows only the lower part of the native data. Part blank.

Note 4: If you want to achieve and IGATE GPRS uploading, you need to plug a valid GSM SIM card

### 三、AVRT6 Software Downloads and connection method

1. Software download : <http://www.y027.com/dvbbs8/dispbbs.asp?boardid=5&Id=838>

2. Connection method :

Note: 1. If your computer prompts MSComm32.ocx problem, see

here: <http://www.y027.com/dvbbs8/dispbbs.asp?boardid=5&id=790>



2. Configure the software prompts appear Invalid picture errors WIN7 64 resolve the following methods. <http://www.y027.com/dvbbs8/dispbbs.asp?boardid=5&id=841&page=1&star=1>

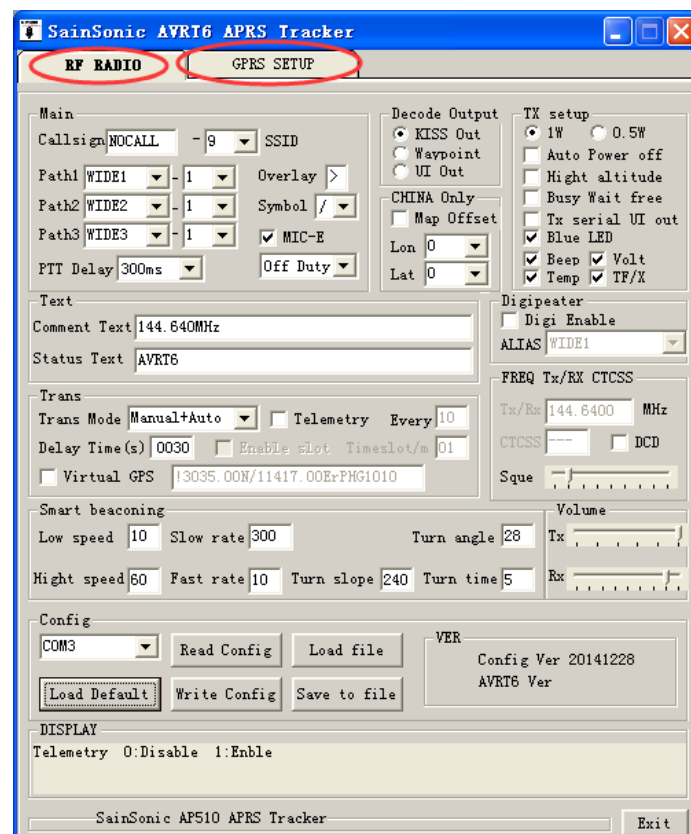


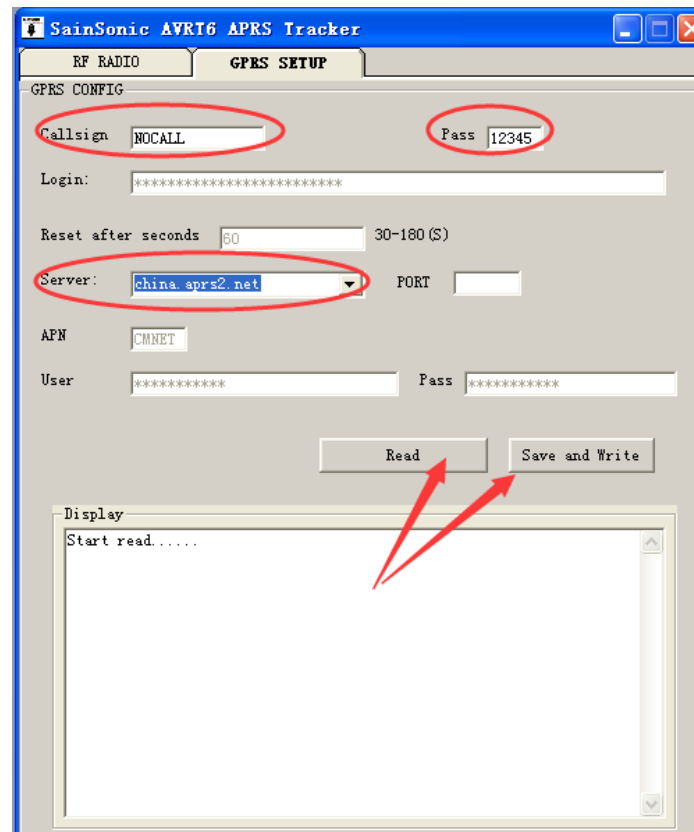
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### 3.AVRT6 configure the connection method steps:

- . a random distribution of installed cable PL2303 USB drive;
- . b Disconnect the power and data cable connections T6;
- . c Open T6 configuration software, select the correct COM port data lines (PC computer equipment manager which can be seen), click to read the configuration (Read Config) button;
- . d immediately connect T6 and mini USB data cable, you can configure the prompt reads success;
- e. After the modification, you can write (Write Config)

After g. After setting the basic configuration interface can continue to set GPRS page, just need to set up your own call sign, 5 authentication password and select the server, and then point to Save and Writey, waiting for data to be written to save, then return RF RADIO interface, the lower right corner point EXIT , wait for the machine can restart.





#### 四. AVRT6 Configuration Parameter Description

Note: Please use the included USB cable, USB-TTL circuits containing not charged with a regular USB cable or upgrading, configuring software.

First, the main setting options (main)

Callsign (Callsign): Set the callsign (4-6 capital letters). For example: BG6QBV

Suffix (SSID): callsign suffix used to distinguish between different mobile terminals. For example: 9

Path (PATH1-3): Path 1-3, for setting the spread allowed relaying the scope and number (can be customized). For example: PATH1: WIDE1; SSID: 1 or Non (indicating no path)

Symbol (symbol): "/" and "\". For example: ! 3012.34N / 11418.95E>

Mobile terminal (overlay): For example: ">." Detail settings shown below.

!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/	0
1	2	3	4	5	6	7	8	9	:	;	<	=	>	?	@
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_	`
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p
q	r	s	t	u	v	w	x	y	z	{		}	~		



符号库

“”

符号库

“”

Launch delay (PTT Delay): Pre-amble of the length of time a packet, usually set time 480ms, more used to wake up the receiver power saving features and ease of receiving equipment to decode. For example: aprs want to relay, it is recommended to set 600ms, the mutual position between the handset report recommended 300ms or 480ms.

Compression format launch (MIC-E format): aprs common coordinate a compressed data format hexadecimal numbers, decoded data may be non-normal display, less compressed byte packets, help to improve communication efficiency.

**MIC-E compression format, 8 states:**

**Second, decoding the serial output options (Decoder output)**

When AVRT6 receive a decoded data, the decoded data from the serial output, there are three common output formats to choose from.

1. Original data output (KISS out): is a raw data output, for example: since the front part of the packet has been shifted, so it looks like the previous data is messy.
2. waypoint data output (Waypoint out): only receive targeted waypoint coordinates will output data. For example: @ GPWPT, .....
3. UI frame output (UI out): the display medium is typically in a format, the reduction of various compression formats into readable data. For example: MIC-E decoding the compressed output format: (BG6QBV-6> SPSVP4, WIDE1-1: `\* -\_ l" 7> / "6d} 144.640MHz)

**Map offset correction (Map offset)**

Well-known reasons, google maps CHINA is biased, in some applications, in order to GPS data points can be displayed correctly on the map, using the GPS raw data offset some numerical methods to correctly display the offset map on. (Usually China google map required)

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### Third, the text display options

1. **Comment Text (Comment text):** After writing data annotation, usually included with the data after the positioning coordinates. (AVRT6 supports English characters sent 0-40)
2. **Status text (Status text):** status text data, typically display device status and frequency information. Sent when the device is not positioned. (Supports 0-40 characters transmitted)

### Fourth, the transmission mode options

Send mode options, a total of five kinds of modes to choose from:

1. **Manual send (Manual):** supports only manual trigger button AVRT6 sent once.
2. **automatically sent (Auto):** According to the delay time (Delay time) set the time automatically sent once. For example Delay time = 30 seconds, 30 seconds after the device automatically sends every position. (Delay time in seconds).  
NOTE: APRS server receives packets required time interval, the proposed transmission interval of 20 seconds or more, to avoid rejection of the server data packet.
3. **Manual Automatic Mixed Mode (Manual + Auto):** both can be sent manually, you can also send automatic timing.
4. **Intelligent beacon mode (Smart):** Intelligent beacon activation parameters in this mode can be selected. Equipment will be based on the speed, direction, time to make a judgment, as far as possible with the least number of transmissions to outline a perfect corner route.
5. **Smart + manual mode (Smart + manual):** supports smart beacons and manual modes.  
For more information about the Smart Beacon:

<http://info.aprs.net/index.php?title=SmartBeaconing>

6. **Send virtual coordinate (Virtual GPS):** You can set a fixed virtual coordinates, usually

in the setting up repeater station or fixed station use. For example format:

! 3035.00N / 11417.00ErPHG1010

About PHGD settings:

### 7. telemetry (Telemetry): Allow telemetry.

Interval times (Every): data sent once every few telemetry data. For example Every = 5, then every five packets sent once telemetry data.

Telemetry data in two formats, a non-compressed format, one is compressed format. Can display the number of satellites, the temperature and voltage AVRT6 transmitting acquired in aprs.fi.

### 8. Time synchronization transmitter function (Time slot):

Usually need to team work, a plurality of devices according to the time number, and then based on the satellite time to stagger the transmission time. For example: There are 60 devices, each terminal transmits every 1 minute once. 0 No. machine 12:00:00

s c launch ... .. (to be upgraded)

etup)

on

to power off): no function.

port 50,000 meters above sea level.



The first comment character: "K" indicates the state OK, "F" indicates the state failed, "E" indicates the status of the error.

1. Busy waiting (Busy wait free): automatically launch is detected before the channel is idle, if the channel is occupied, then wait until the transmitter is idle. (Functions to be done in ....)



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2. transmit serial data output (Tx serial UI OUT): UI when VHF transmit data packets can be transmitted simultaneously from the serial output of the machine, for some mapping software can view your current location)

6. The blue LED status display (Blue led): If you choose to allow, then when GPS positioning LED will lit, otherwise the LED goes out after positioning.

7. Beep (Beep): emit a beep when selectable switch, the switch can not turn off the machine beeps. (To be tested)

8. voltage display (Volt): Comment increasing the voltage display data packet transmissions. For example: "3.56V"

9. Temperature Display (Temp): launch annotation data packets increase the temperature display. For example: "+ 18,4C"

Six relay function settings (Digiperter)

Aprs data signal can be set to forward received. You can set the forwarding conditions, such as "WIDE1" can be forwarded contain "WIDE1-1" route packets. Not forward packets sent their own or have been forwarded packets.

## VII. Squelch adjustment

Soft squelch (DCD): LED control switch, when time permitted, only GPS for positioning and accept no emission when flashing, the other time and manner does not light.

	Blue LED	DCD	GPS valid	gps invalid	TX	RX	SQL open	SQL off
1	on	on	light	blink	light	fast blink	off	off
2	on	off	light	blink	light	fast blink	blink	off
3	off	on	off	blink	light	fast blink	off	off
4	off	off	off	blink	light	fast blink	blink	off
check=on								

Eight Transmit modulation (Tx Volume)

Modulation transmitter (Tx Volume): range 1-6, default 6.

## IX. Configuration settings (config)

- 
1. Select the serial port (com): You can select the data input lines of the serial number or the serial number (need to install the PL2303 USB-TTL line drivers).
  2. Remove the default value (Load default): read the recommended default parameters.
  3. Read the device configuration parameters (Read config): reads the configuration parameters stored in the internal device. (Need to enter configuration mode)
  4. Write the current configuration parameters (Write config): write the current configuration parameters. (Need to read ahead parameter or remove the default parameter write)
  5. Read the configuration file (load file): reads the configuration ini file stored on your computer.
  6. Save the configuration file (Save to file): Save the current parameters to a computer file.

#### X. Other options

Message (DISPLAY): Message window message configuration parameters, for reference, for more information see the configuration software.

Exit button (EXIT): Software exit configuration mode, while the output of the command to make AVRT6 exit configuration mode.

#### Five .ROM upgrade method:

Note: Please use the included USB cable, USB-TTL circuits containing, can not use ordinary USB cable.

AVRT6 software upgrade method: (to be written to the device ROM)

1. Download Brush software ARUBD, set up the software serial number, other do not change (the default rate is 115200bps; flash space, the default is 128K).
2. loaded to upgrade HEX;
3. Disconnect AVRT6 connections and power, then click to upgrade the software in "Operation" menu "download";



USB connection until the  
green LED flashes, repeat

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### Caution:

1, the power supply voltage input for 7V-12V, which is compatible with 12V car use and design.

You can also use the 5V mobile power supply plug the USB cable, but GPRS signal strength has changed so much and large power consumption. Long-term stability can not be guaranteed.

2, GPS ephemeris data, power and memory modules for 3-4 hours (ephemeris changing all the time, the longer the time, the greater the error. Longer memories time meaningless).

3, the distribution of GSM antenna for the best match of the quad-band antenna. Common market, GSM antenna with extended cable tested N species, moving at high speed on the highway will be disconnected. It is not recommended to replace themselves.

4, distribution of active GPS antenna for two amplified antenna, the voltage is 3.3V. A gain of about 26DB. A pillar mounted on the car has been very good effect. For a better second speed of the first positioning effect, the same voltage replaceable head of mushroom GPS antenna on the roof.

5, the display shock level for normal vehicle use only. If you need powerful shock. For example 5 m drop test. Gluing your own glass from the edge of the screen. To strengthen the earthquake. Peril.

6, USB-TTL cable built-in conversion chip, not a substitute for an upgrade or configuration with ordinary USB cable.

7, USB power output does not support the power to Derek handheld work (to improve subsequent versions ...).

## 五. AVRT6 Example of the Beginner



Connected as shown, insert a valid SIM card is the easiest track GPRS network upload function. Only the bottom line of the display has a display data, display the number of satellites, the temperature, pressure and supply voltage.

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Use this to see the coordinates and distance less than his teammates or partners, but in the server site, via phone or computer to open the site to view your current location.

Note: only supports GSM GPRS network SIM card has been testing mobile 2G network SIM card can be used normally.

2, only the radio connection to upload and receive decoded data (RF)





Connected as shown, do not insert a SIM card is only an RF transceiver to use their own positioning data, Communications ended in an instant release of PTT microphone in hand, T6 coordinate data by launching their own car station. After the GPS positioning, car station received coordinate data, displayed on the screen, to show the other side of the distance and call signs and other data in real time, this can be done Communications and locate each other.

ICOM car sets, have been measured supported models 208,2720,2820

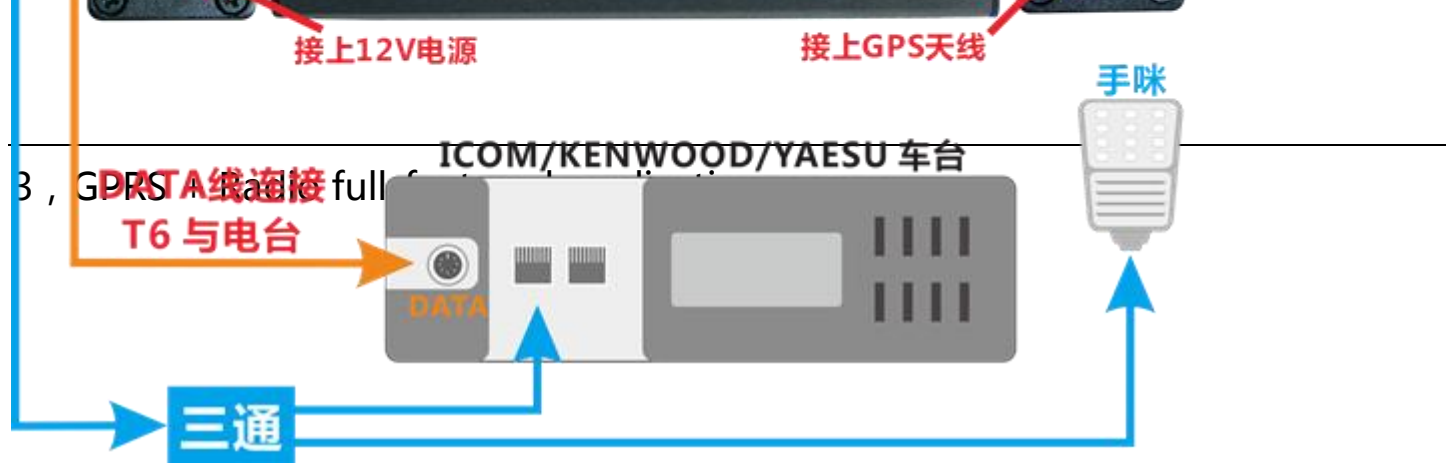
YAESU car sets, have been measured 7800,7900,8800,8900,817,857,897 supported models,

KENWOOD car sets, have been measured supported models V7A

These models have been tested, other models can also try unmeasured

In addition, you can DIY wiring to any vehicle platform or hand sets use, provided that you know how wiring.

You can also purchase a dedicated hand-K plug connect the data cable, take over station transceiver use. . .

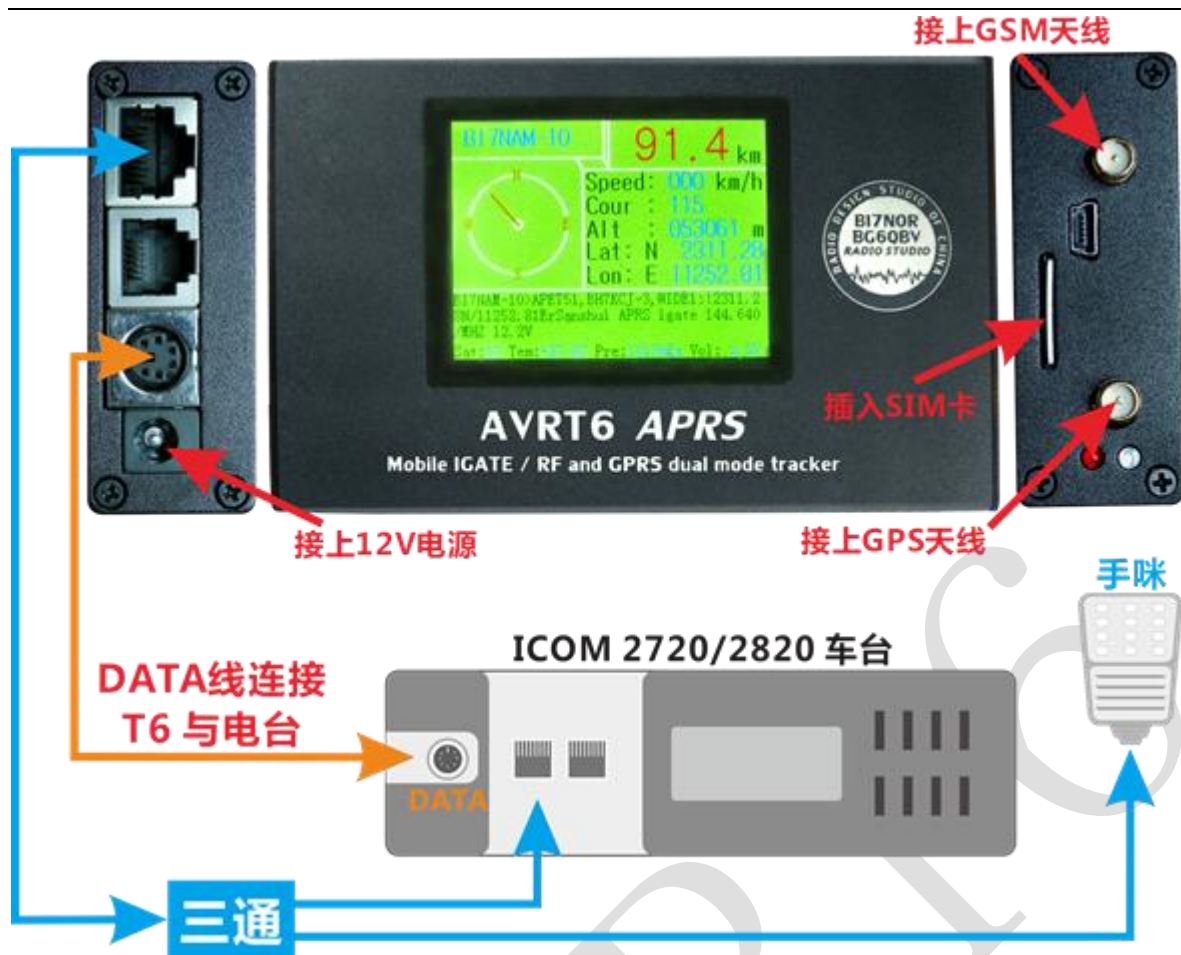


如图所示连接，相比上面的应用，就是插入了 SIM 卡。这样就是 GPRS+RF 双轨迹上传，而且有 IGATE 功能，也就是上传网关。

GPS 定位后，电台接收到对方的座标数据，T6 内部的 TNC 解码显示出来，并且会实时通过 GPRS 网络，将对方的座标数据上传到服务器（IGATE）；自己的位置数据，在通联时手咪 PTT 放开的瞬间，会通过车台发送出去，同时，这个数据，也会通过 GPRS 直接传送至服务器。

如果装在车上，就能兼作移动网关使用。这一功能在车队出行，应急救援等等场合很实用。

#### 4，ICOM-IC2720 配合 T6 实现双频发射和双频接收应用（强烈推荐）



如图所示，强烈推荐使用 ICOM-2720 车台配合使用，因为使用 2720 配合 T6 使用，除了有上述全功能使用外，会额外增加一项功能，就是“**自动调用副信道发射功能**”。所谓的自动调用副信道发射，就是当你在主信道守候或通联时，如果 T6 主动（T6 选择智能定位功能，到了某触发条件就会自动主动发射）发射你的位置数据包。2720 会自动切换到副信道发射这个数据包。

这一功能很实用，例如，当 T6 配置为手动+自动发射时，你的 2720 车台主信道频率是 438.500，副信道是 144.640，在这种情况下，接收来自 438.500、144.640 频率上的位置数据包，T6 都会解码显示和上传到服务器。而且，在 438.500 通联时，放开手咪 PTT 瞬间，T6 会通过 438.500 发射数据包；T6 到了某触发条件而主动发射位置数据包时，T6 会通过 144.640 发射数据包。也就是说，用 2720 配合 T6 使用，可以双频发射和双频接收位置数据包。

再看看，2720 要怎样设置？才能实现 **自动调用副信道发射功能**

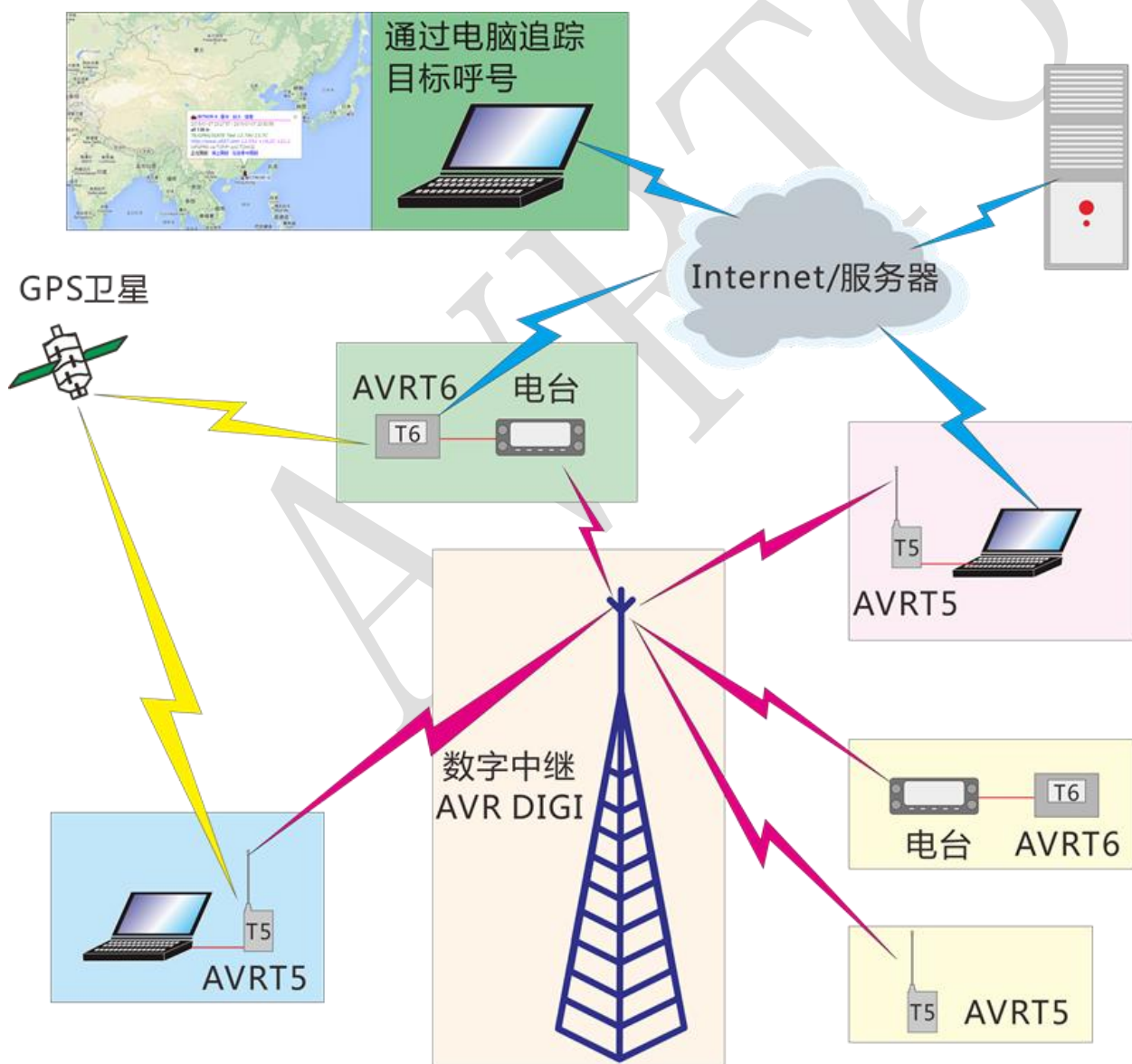
设置步骤如下：

1. 按住[SET LOCK]并同时开启电源，进入初始设置模式

2.用[SET LOCK] 或[LOW PRIO]找到“PAC”（数据包操作段）选项，用调整旋钮（左边）调整修改为“R”或“L”（如果左边是主信道，就设置为 R；如果右边是主信道，就设置为 L）

话说回来，如果用 2720，不需要双频发射，仅使用 **自动调用副信道发射功能**，可以不接手咪线和三通，也就是仅接 DATA 线就行了。

## AVRT5 和 AVRT6 在 APRS 系统中的作用图解



### 重要配置特别说明：



箭头所示是背光控制，升级软件后，一定要重新选择这里，否则，可能会黑屏

选择：ON 代表背光长亮

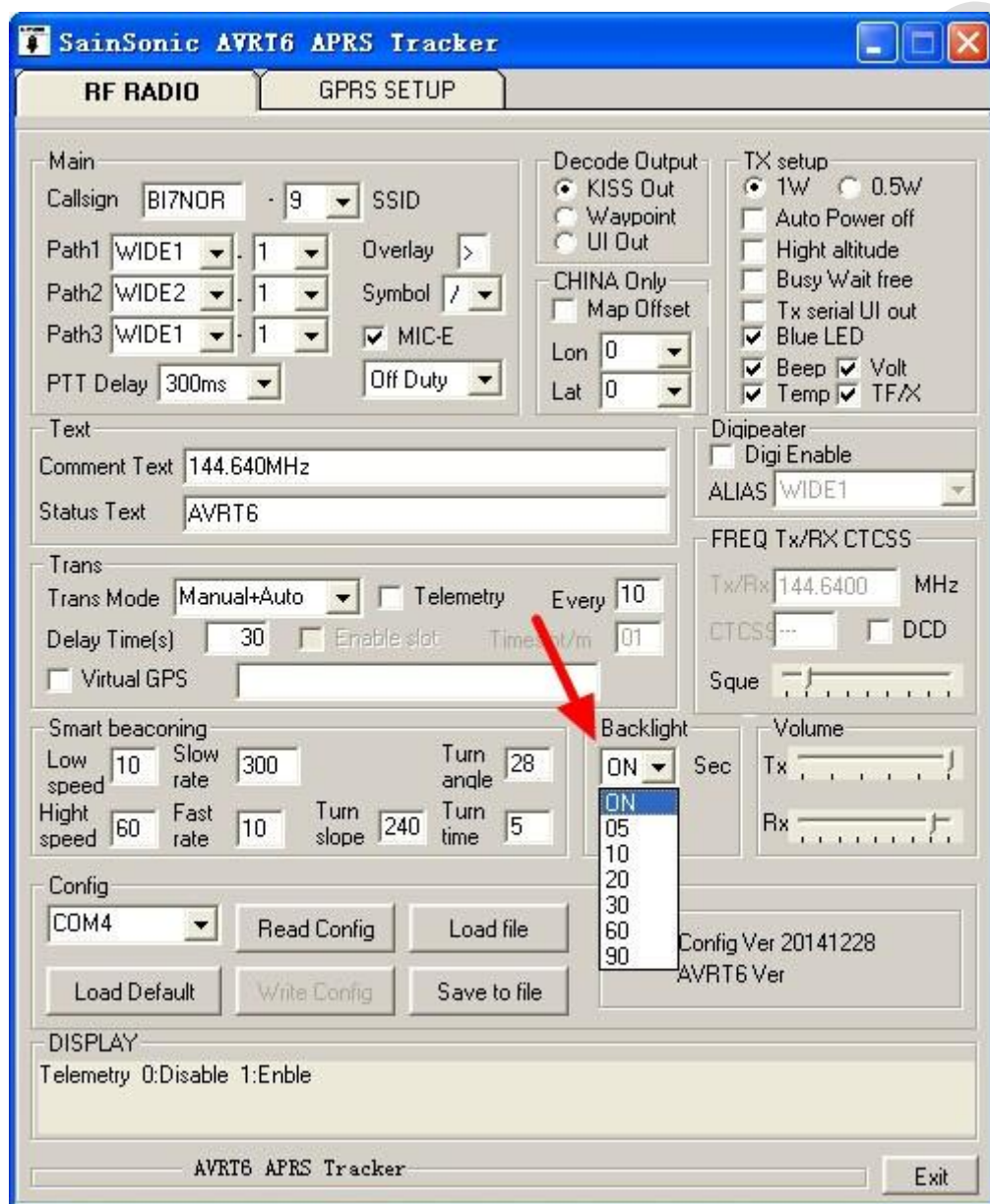
5 代表接收到对方座标信号后显示 5 秒，背光就会熄灭

10 代表接收到对方座标信号后显示 10 秒，背光就会熄灭

依此类推。。。。。。。

90 代表接收到对方座标信号后显示 90 秒，背光就会熄灭

在家里使用，建议使用长亮，在车中使用，个人建议显示 30 秒合理一些（根据你的个人喜好选择）





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所有说明描述，因地区文化差异。如有疑问，请加群交流，QQ 群号 30531489；或者到网站 [www.y027.com](http://www.y027.com) 交流；也可以百度一下“APRS”，看看其它 HAM 爱好者的见解！

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APR16